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Reitzel

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(54) **DISPOSABLE BATTERY SAFETY COVER**

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H01R 4/70 (2006.01)
H01B 17/38 (2006.01)
H01M 2/34 (2006.01)

(52) **U.S. Cl.**
CPC ***H01B 17/38*** (2013.01); ***H01M 2/344*** (2013.01); *H01M 2/34* (2013.01)

(58) **Field of Classification Search**
CPC H02G 3/081; H02G 3/14; H01M 2/344; H01M 2/342; H01M 6/46; H01M 2/20; H01M 2/32; H01M 2/34; H05K 5/03; H01B 17/38; H01R 4/70
USPC ..... 174/138 F, 66, 67, 50, 135, 137, 138 G, 174/137 R; 220/241, 242; 429/1, 163, 65, 429/100, 121; 439/759, 536, 754
See application file for complete search history.

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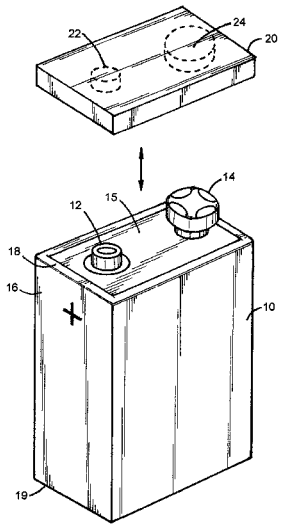
(57) **ABSTRACT**

A nine volt battery includes terminals exposed on a top surface of the battery and can easily accidentally come into contact with a conductive material. A device is provided for preventing creation of a low resistance circuit by a nine volt battery includes a safety cover configured to securely adhere to at least one of two terminals of the battery, thereby preventing creation of a circuit through the battery.

14 Claims, 6 Drawing Sheets



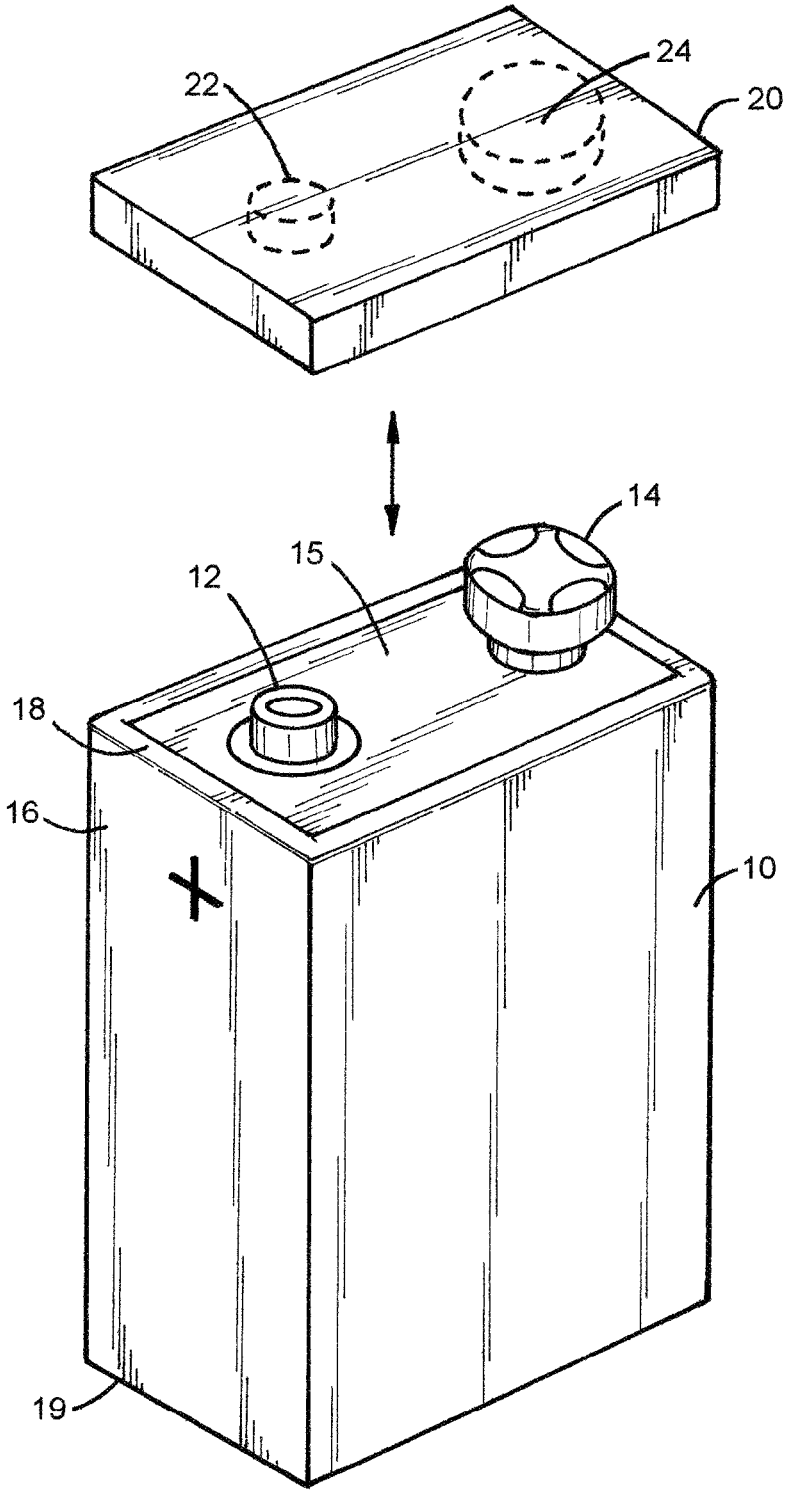


FIG.1

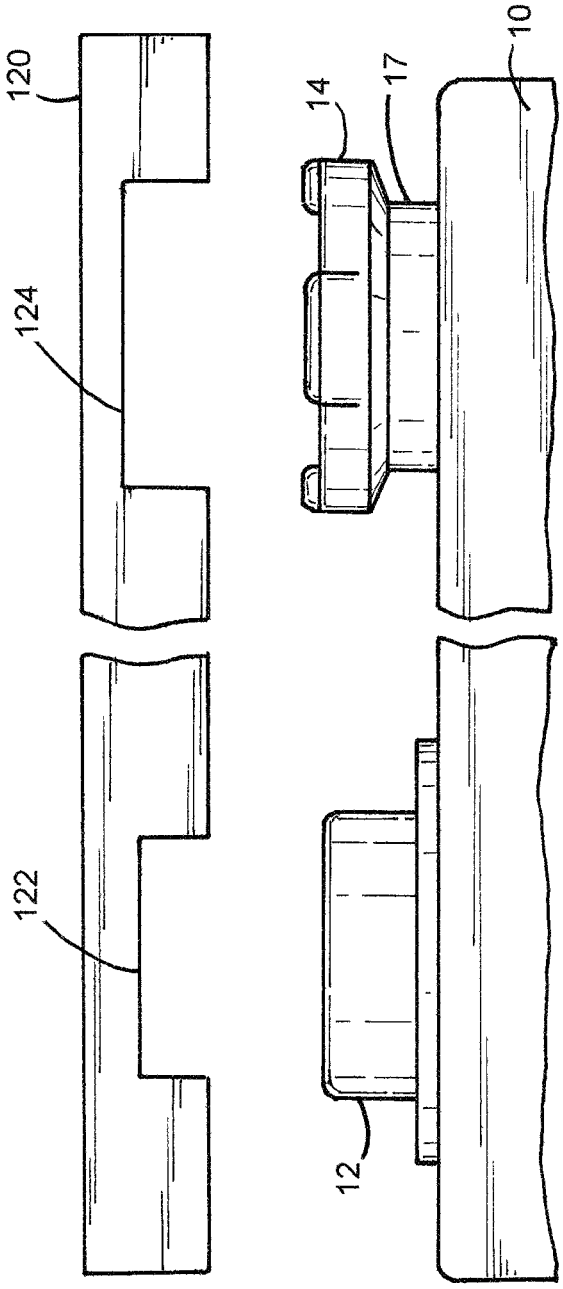


FIG.2

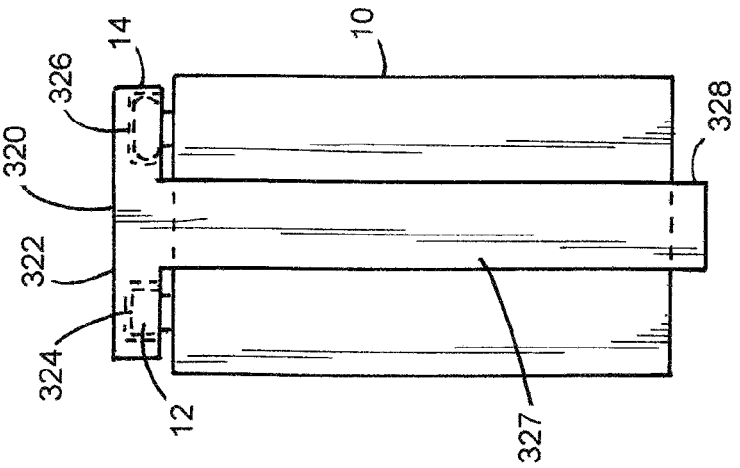


FIG.4

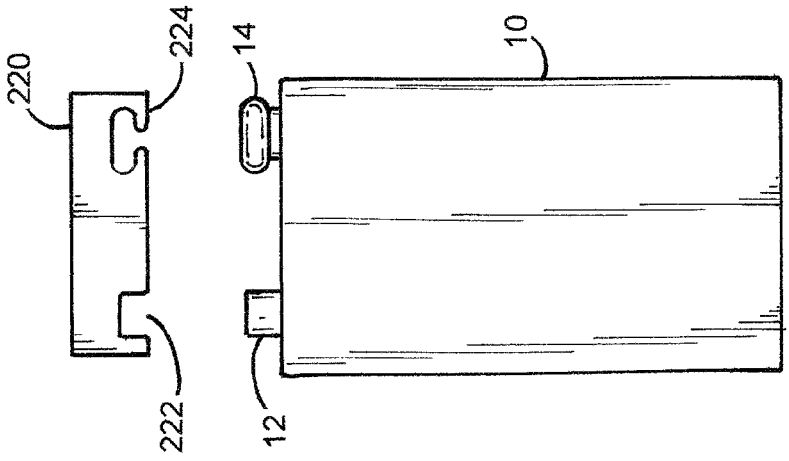


FIG.3

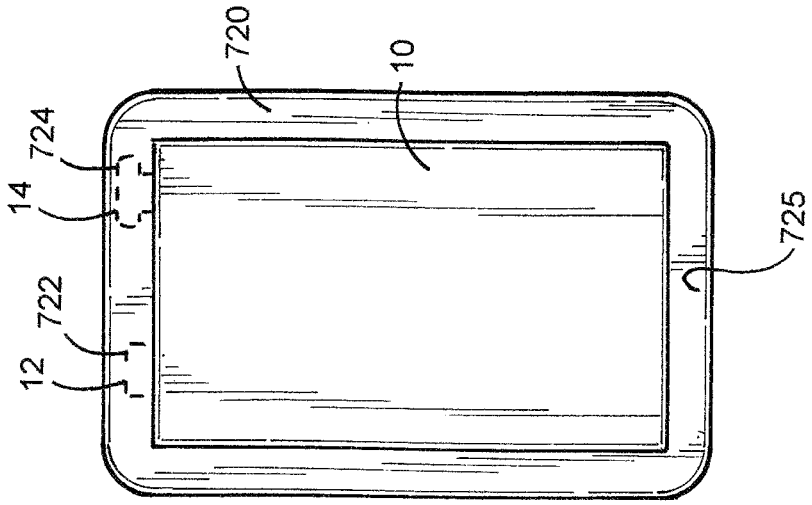


FIG.8

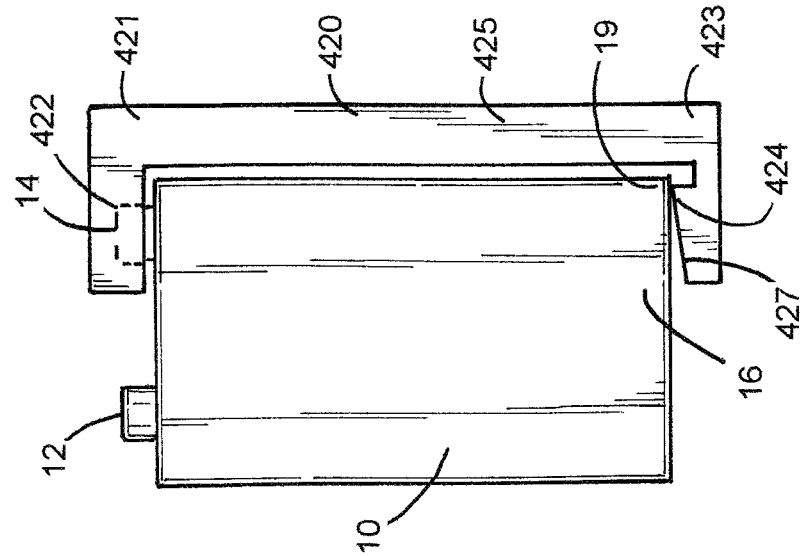


FIG.5

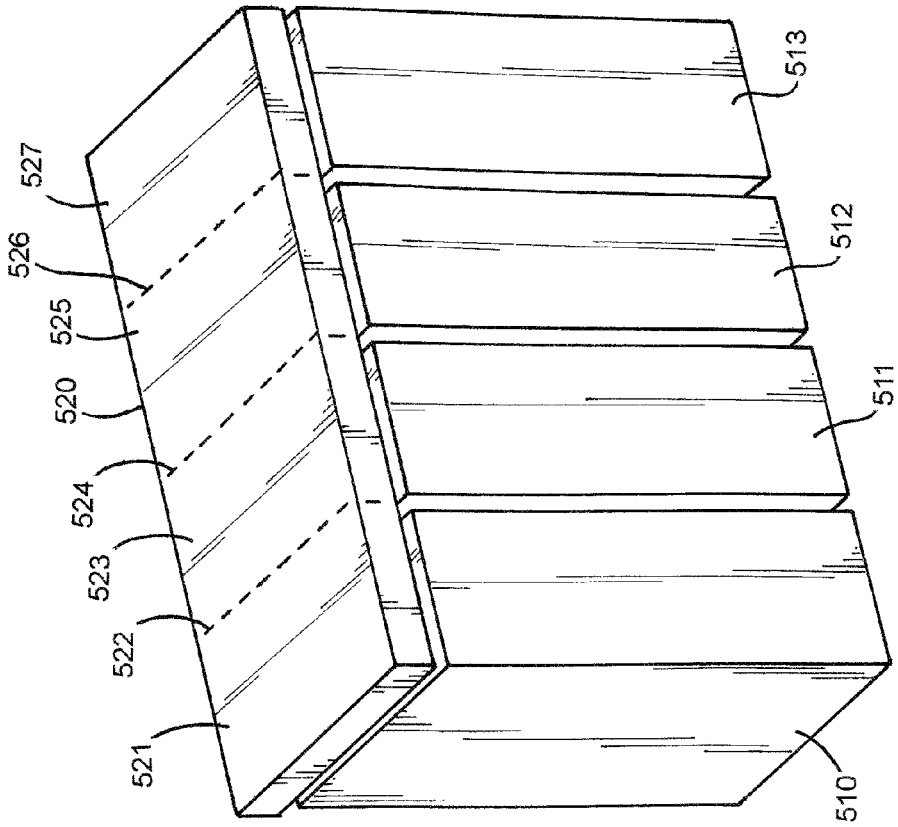


FIG.6

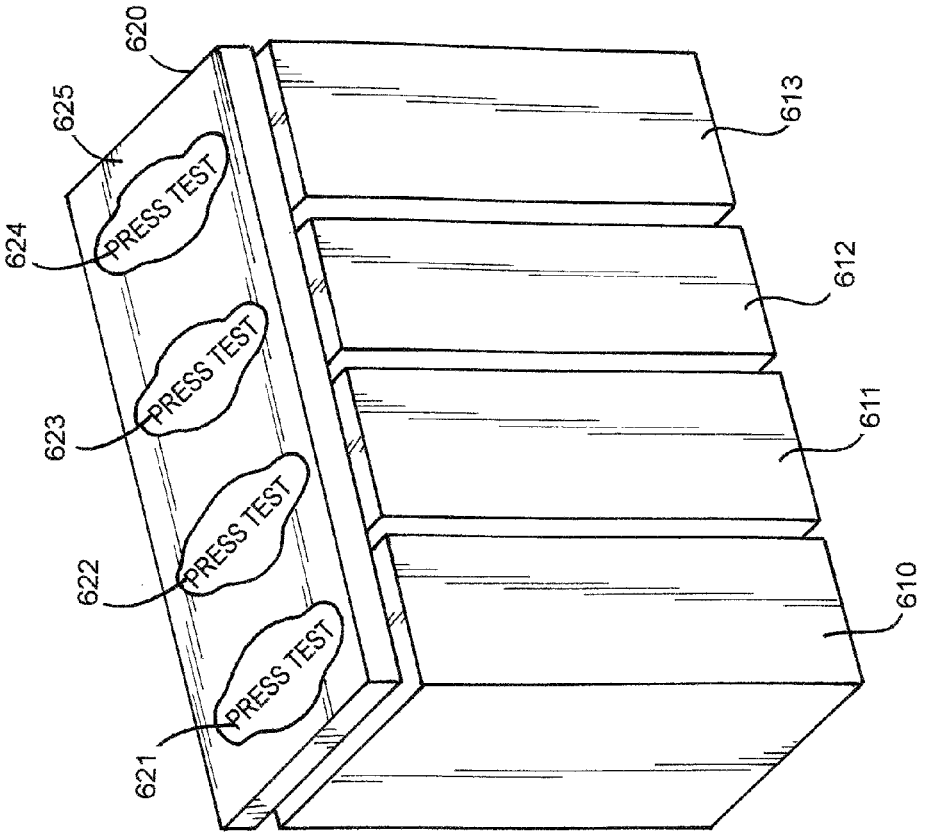

620
625
624
623
622
621
PRESS TEST
PRESS TEST
PRESS TEST
PRESS TEST
613
612
611
610

FIG.7

DISPOSABLE BATTERY SAFETY COVER

TECHNICAL FIELD

This disclosure is related to an object for use in covering battery terminals. In particular, the disclosure is related to a disposable safety cover used to stop nine volt batteries from coming into contact with a conductive material and creating a low resistance circuit.

BACKGROUND

The statements in this section merely provide background information related to the present disclosure. Accordingly, such statements are not intended to constitute an admission of prior art.

Batteries are known devices which provide portable direct current electrical power for battery powered devices. A nine volt battery is a widely known and widely used battery configuration wherein a positive terminal and a negative terminal are present upon a same top surface of the battery.

Electrical circuits are known in the art and require that electrical energy can flow in a complete circuit. A battery or a plurality of batteries can be used in a circuit, wherein a battery provides a voltage potential or voltage rise in the circuit. For a given voltage potential, a current in the circuit can be determined according to the relationship voltage potential equals current times electrical resistance. When resistance is relatively high in an electrical circuit, the current for the circuit is relatively low. When resistance is relatively low in an electrical circuit, the current for the circuit is relatively high. If resistance is very low in a circuit including a battery, the current can get very high. In such a low resistance circuit, the battery supplying the electrical energy to the circuit can heat up significantly to a point where a dangerous thermal event can in certain circumstances be created.

Nine volt batteries are designed to have very low resistance between the internal components of the battery and the battery terminals. If any conductive piece spans the two terminals of a nine volt battery, e.g. if a piece of aluminum foil is discarded in the same waste container as a partially depleted nine volt battery and touches both terminals, a very low resistance circuit can be created causing a thermal event in the battery.

Batteries contain chemicals that can be detrimental to the environment if the battery is simply thrown into a landfill. Recycling of batteries has become popular. While a partially depleted battery may include too little voltage potential to continue to be used by a consumer and may be ready to be recycled, the battery still can have enough charge to power an electrical circuit. Consumers wishing to recycle batteries will frequently store used batteries in groups, for example, in a bag or a box, until enough of them have been collected to warrant the effort to take the batteries to a recycling center. A group of nine volt batteries tossed into a bag or a box can accidentally create low resistance circuits.

SUMMARY

A nine volt battery includes terminals exposed on a top surface of the battery and can easily accidentally come into contact with a conductive material. A device is provided for preventing creation of a low resistance circuit by a nine volt battery includes a safety cover configured to securely adhere to at least one of two terminals of the battery, thereby preventing creation of a circuit through the battery.

BRIEF DESCRIPTION OF THE DRAWINGS

One or more embodiments will now be described, by way of example, with reference to the accompanying drawings, in which:

FIG. **1** illustrates an exemplary embodiment of a safety cover to be installed to a nine volt battery, in accordance with the present disclosure;

FIG. **2** illustrates a first embodiment of an exemplary safety cover in cross-section, in accordance with the present disclosure;

FIG. **3** illustrates a second embodiment of an exemplary safety cover in cross-section, in accordance with the present disclosure;

FIG. **4** illustrates a third embodiment of an exemplary safety cover, in accordance with the present disclosure;

FIG. **5** illustrates a fourth embodiment of an exemplary safety cover, in accordance with the present disclosure;

FIG. **6** illustrates an exemplary safety cover strip including a plurality of separable safety covers, in accordance with the present disclosure;

FIG. **7** illustrates an exemplary safety cover strip including test strips located to each battery connection, in accordance with the present disclosure; and

FIG. **8** illustrates an additional exemplary embodiment of a safety cover including an elastic band wrapped around the battery and covering at least one terminal of the battery, in accordance with the present disclosure.

DETAILED DESCRIPTION

Low resistance circuits can be created by any conductive material spanning the terminals of a nine volt battery. In one example, a piece of metallic waste can come into contact with the terminals. In another example, a metallic casing on one nine volt battery can come into contact with terminals on another nine volt battery. In another example, two nine volt batteries can accidently touch negative to positive terminal, negative to positive terminal.

A low resistance circuit including a nine volt battery and a piece of conductive material spanning the terminals of the battery can be avoided by preventing contact between at least one of the terminals and the conductive material. A device for preventing creation of a low resistance circuit including a nine volt battery is provided including a disposable safety cover preventing at least one of the terminals of the battery from contacting any conductive material.

Referring now to the drawings, wherein the showings are for the purpose of illustrating certain exemplary embodiments only and not for the purpose of limiting the same, FIG. **1** illustrates an exemplary embodiment of a safety cover to be installed to a nine volt battery. Nine volt battery **10** is illustrated including positive terminal **12** and negative terminal **14**, both located upon top surface **15** of the battery. Battery **10** further includes a metallic jacket **16** which includes wrapped edge **18** and wrapped edge **19**. Safety cover **20** is illustrated including a battery connection hole **22** configured to receive terminal **12** and battery connection hole **24** configured to receive terminal **14**. Safety cover **20** and the included battery connection holes can include a snap-on design, such that the cover includes a detent feature securingly attaches to the battery to prevent the cover from accidentally falling off. The holes, in one embodiment, can be tapered or constricted at the openings to create a more secure fit. Safety cover **20** can be sold as individual units or can be sold installed to fresh batteries, such that a user can install the old battery to the safety cover from the new battery as part of the replacement process.

Safety cover **20** can be made from any of a number of non-conducting materials including polymers, wood, recycled paper material. Battery terminals **12** and **14** are configured to snap to metallic connectors known in the art which normally are attached to electrical wires to create a circuit in a battery powered device. Safety cover can include metallic dummy connectors which do not connect to wires and do not create a circuit. In one embodiment, a production facility making battery terminals with electrical leads attached for battery powered devices could produce battery terminals without the electrical leads attached for use as disposable safety covers.

FIG. **2** illustrates a first embodiment of an exemplary safety cover in cross-section. An elastic or rubberized safety cover can be configured to receive a nine volt battery by stretching the elastic material and allowing the elastic material to apply a gripping force upon the battery terminals to remain attached to the battery. Battery **10** is illustrated including terminal **12** and terminal **14**. Safety cover **120** is illustrated including battery connection hole **122** and battery connection hole **124**. Safety cover **120** is constructed of a rubberized polymer that elastically stretches when a force is applied and recovers to its original shape when the force is removed. Battery connection hole **122** is too small to receive terminal **12**, but as safety cover is stretched or pressed against battery **10**, the rubberized polymer material deforms around terminal **12**. Similarly, battery connection hole **124** is too small to receive terminal **14**, but as safety cover is stretched or pressed against battery **10**, the rubberized polymer material deforms around terminal **14**. In one embodiment, the battery connection holes can include diameters between 1 mm to 4 mm smaller than the corresponding battery terminal, depending upon the particular rubberized material and the desired snap on and snap off force desired for the safety cover. Terminal **14**, the negative terminal of the battery, includes undercut feature **17**, and safety covers can include a feature or features to grip to the undercut feature **17**.

If the safety cover is made of less elastic or more rigid materials, relatively small holes can be used to create battery connection holes, with an interference fit between the holes and the terminals creating the desired snap on fit of the safety cover to the battery. Such interference fits would depend upon the specific materials and can be designed according to methods known in the art. In one embodiment, the battery cover can be constructed of recycled paper material similar to a paper material egg carton known in the art. Such a recyclable material could include marketing advantages for consumers practicing environmentally sensitive recycling.

FIG. **3** illustrates a second embodiment of an exemplary safety cover in cross-section. Battery **10** is illustrated including terminal **12** and terminal **14**. Safety cover **220** made of an elastic material is illustrated including battery connection hole **222** configured to receive terminal **12** and battery connection hole **224** configured to receive terminal **14**. Battery connection hole **224** is shaped to positively grip around terminal **14**. Further, battery connection hole **222** and battery connection hole **224** are positioned closer together than terminals **12** and **14**. As a result, when safety cover **220** is installed to the terminals of battery **10**, the stretch of the material between battery connection hole **222** and battery connection hole **224** causes safety cover **220** to be secured to the terminals.

FIG. **4** illustrates a third embodiment of an exemplary safety cover. Battery **10** is illustrated including terminal **12** and terminal **14**. Safety cover **320** constructed of a hard plastic material is illustrated. Safety cover **320** includes upper tab **322** and lower tab **328** connected by vertical member **327**. Upper tab **322** includes features to grip to terminals **12** and **14**, for example, including terminal receiving holes **324** and **326** engaging to terminals **12** and **14**. In another embodiment a slot running the length of tab **322** could engage both of the terminals. The features to grip the terminals should contain the terminals such that the terminals cannot slide out of the features without vertically displacing tab **322**. Tab **328** grips to a bottom side of battery **10**. In one embodiment, tab **328** can include a feature to either grip to the metal jacket around battery **10** or grip to a far side of the battery. By gripping a top and bottom of battery **10** including terminals **12** and **14**, the plastic safety cover **320** can remain securely engaged thereto. Any of a wide variety of plastics including but not limited to polypropylene and acrylonitrile butadiene styrene (ABS) can be used to injection mold plastic cover **320**.

Safety covers can cover or engage to both terminals of a nine volt battery to avoid creation of low resistance circuits. However, as both terminals on a battery need to be engaged in order to create a circuit including the battery, covering of one terminal of the battery would be effective to prevent creation of the low resistance circuit. FIG. **5** illustrates a fourth embodiment of an exemplary safety cover. Battery **10** is illustrated including terminal **12** and terminal **14**. Safety cover **420** constructed of a plastic material is illustrated. Safety cover **420** includes upper tab **421** connecting to a terminal of battery **10** with feature **422**, lower tab **423** connecting to a bottom surface of battery **10** with feature **424**, and vertical member **425**. Battery cover **420** is illustrated gripping to terminal **14**, but terminal **12** can equally be utilized to avoid creation of a circuit with battery **10**. Feature **424** can include an angled lead in **427** and a feature gripping to wrapped edge **19** of metallic jacket **16**.

FIGS. **4** and **5** illustrate a hard plastic safety cover that grips to a top surface and a bottom surface of the battery to cover at least one of the terminals of the battery. FIG. **8** illustrates an additional exemplary embodiment of a safety cover including an elastic band wrapped around the battery and covering at least one terminal of the battery. Battery **10** is illustrated including terminal **12** and terminal **14**. Safety cover **720** constructed of an elastic material similar to a rubber band is illustrated. Safety cover **720** includes features **722** and **724** to engage to terminals **12** and **14**, respectively. Safety cover **720** is configured to be located to the terminals and have distal end **725** be stretched around battery **10**, such that the stretched safety cover **720** will remain engaged to the terminals.

In an alternative embodiment, safety cover **720** could be constructed of a recycled paper material, and a back portion of the safety cover **720** could be filled in to cup the battery **10** within a perimeter of safety cover **720**, with the battery wedging within the cavity formed in the cover like an egg being secured to an egg carton.

FIG. **6** illustrates an exemplary safety cover strip including a plurality of separable safety covers. Batteries **510**, **511**, **512**, and **513** are illustrated secured to safety cover strip **520**. Safety cover strip **520** includes a plurality of separable safety covers **521**, **523**, **525**, and **527** separated by perforations **522**, **524**, and **526**, respectively. Perforations can include thinned sections or otherwise weakened sections of safety cover strip **520**, permitting a user to apply a bending force, twisting force, or pulling force to remove one of the safety covers from the safety cover strip. In one embodiment, safety cover strip **520** can be sold or provided by a recycling company, such that a user can have easy access to a supply of easily accessed individual safety covers as needed. In another embodiment, a set of fresh batteries can be sold with the safety cover strip **520** installed thereto, and as each battery is removed from the

sales package, the attached safety cover can be snapped off and used to secure to the battery being replaced.

FIG. **7** illustrates an exemplary safety cover strip including test strips located to each battery connection. Batteries **610**, **611**, **612**, and **613** are illustrated attached to safety cover strip **620**. Safety cover strip **620** is illustrated as a safety cover remaining intact and accepting more than one battery at a time. Safety cover strip **620** can include a top surface **625** configured to receive an indication by a user indicating whether the battery secured to a particular position is fresh or de-charged. In one exemplary embodiment, a position can be indicated for a user to make an "x" with a permanent marker if the battery installed thereto is de-charged. In another embodiment, a thinned section in safety cover strip **620** similar to a known detent feature in soft drink lids permitting a user to press the detent an permanently cause strain discoloration in a plastic material can be used to show that the battery installed to that position is de-charged. Safety cover strip **620** includes optional voltage test strips **621**, **622**, **623**, and **624** which, when depressed, include an indication of a present charge of the attached battery. According to one known embodiment widely used by Duracell®, depression of a test button causes a coloration indicator to change colors based upon a voltage available in the battery being tested. As safety cover strip **620** is filled with de-charged batteries, the entire strip can be recycled as a unit.

The disclosure has described certain preferred embodiments and modifications of those embodiments. Further modifications and alterations may occur to others upon reading and understanding the specification. Therefore, it is intended that the disclosure not be limited to the particular embodiment(s) disclosed as the best mode contemplated for carrying out this disclosure, but that the disclosure will include all embodiments falling within the scope of the appended claims.

The invention claimed is:

1. A device for preventing creation of a low resistance circuit by a nine volt battery, the device comprising:

a safety cover configured to securely adhere to at least one of two terminals of the battery, the safety cover comprising:

a single piece polymer body; and

at least one hole with a smaller diameter than a diameter of the terminal of the battery with which it is configured to mate.

2. The device of claim **1**, wherein the safety cover securely adheres to the at least one of the two terminals of the battery by creating an interference fit with the at least one of the two terminals.

3. The device of claim **1**, wherein the safety cover securely adheres to the at least one of the two terminals of the battery by gripping to an undercut feature of a negative terminal of the battery.

4. The device of claim **1**, wherein the safety cover securely adheres to the at least one of the two terminals of the battery by elastically stretching across the two terminals.

5. The device of claim **1**, further comprising a feature configured to attach to one of the terminals; and

wherein the safety cover additionally adheres to the at least one of the two terminals of the battery by elastically stretching around the battery.

6. The device of claim **1**, wherein the safety cover additionally adheres to the at least one of the two terminals of the battery by engaging to a top surface of the battery and to a bottom surface of the battery.

7. The device of claim **1**, further comprising a plurality of separable safety covers connected together as a safety cover strip.

8. The device of claim **7**, wherein the plurality of separable safety covers are joined together by perforated sections.

9. The device of claim **1**, wherein the safety cover comprises a safety cover strip configured to engage a plurality of batteries.

10. The device of claim **9**, wherein the safety cover strip is configured to receive an indication by a user whether a particular attached battery is fresh or de-charged.

11. The device of claim **9**, wherein the safety cover strip comprises test strips configured to provide an indication of a voltage of an attached battery.

12. The device of claim **1**, wherein the safety cover is constructed of a rubberized material.

13. A device for preventing creation of a low resistance circuit by a nine volt battery, the device comprising:

a safety cover configured to securely adhere to terminals of the battery, the safety cover comprising:

a single piece polymer body; and

at least one hole with a smaller diameter than a diameter of the terminal of the battery with which it is configured to mate; and

the battery;

wherein the battery comprises a fresh battery; and

wherein the safety cover is configured to release the fresh battery and subsequently receive a de-charged battery.

14. The device of claim **13**, further comprising:

a plurality of separable safety covers connected together as a safety cover strip; and

a plurality of fresh batteries, each installed to one of the separable safety covers.

* * * * *